ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PDCAC0E060
Data Sensitivity: YES

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Pediocactus sileri* (Engelm. Ex J.M. Coult.) L.D. Benson
COMMON NAME: Siler pincushion cactus, Siler's pincushion cactus, Siler pediocactus, Gypsum cactus
SYNONYMS: *Echinocactus sileri* Engelman, *Utahia sileri* Britton and Rose.
FAMILY: Cactaceae

AUTHOR, PLACE OF PUBLICATION: *Pediocactus sileri* L.D. Benson, Cactus and Succulent Journal [U.S.] 33(2): 53. 1961. *Echinocactus sileri* Engelm. Ex J.M. Coult., Contributions from the United States National Herbarium 3(7): 376. 1896.

TYPE LOCALITY: Pipe Springs, Coconino County, Arizona, but those springs were thought by early collectors to be in Utah, hence the *Utahia*, which commemorates an Arizona type. (Welch et al., 1993).

TYPE SPECIMEN: HT: MO. A.L. Siler s.n. May 1883.

TAXONOMIC UNIQUENESS: Eight species of *Pediocactus*, occurring from the Columbia River Basin, Great Basin, Rocky Mountains and Colorado Plateau. Six of these species, including *P. sileri*, are restricted endemics. There are no recognized varieties of *P. sileri. Pediocactus sileri* does not resemble typical *Pediocactus*, being larger with robust spines. *P. sileri* is included in the genus based on similarities in fruit characteristics with the other *Pediocactus*.

DESCRIPTION: Small, solitary, occasionally clustered, globose, usually single stemmed cactus typically 10.0 cm (4.0 tall) (as great as 45.0 cm [18.0 in.]) tall and 7.6-10.0 cm (3.0-4.0 in.) in diameter. According to Utah Rare Plant Book, cacti are 5.0-25.0 cm (2.0-10.0 in.) tall. This species is depressed-hemispheric to cylindroid and tends to elongate as it ages. Each circular areole contains 3-7 **brownish-black central spines**, these are straight or slightly curved (not hooked), becoming pale gray or nearly white with age. There are 11-16 **whitish radial spines** per areole. The central spines are about 2.5 cm (1.0 in.) long, the radials slightly less. Flowers are about 2.5 cm in diameter, yellowing marginally scarious petals with maroon veins. Fruits are greenish-yellow, somewhat enlarged upwards, with scales toward the top; they dry at maturity. Seeds are gray, 4.5 mm broad.

AIDS TO IDENTIFICATION: Distinctive in its near globose form (except older plants which are more elongate), stout blackish-tipped central spines contrasting with the slender, whitish radials. Easy to distinguish from other cacti; the hedgehog cactus (*Echinocereus*) is thinner stemmed with larger spines. *Coryphantha vivipara* var. *rosea* in the adult stage looks similar; however it has pink flowers and *P. sileri* has thicker radials and fewer central spines (Falk, Jenkins et al. 2001).

ILLUSTRATIONS: Black and white photo (Benson 1969: Fig.8.2, p.183).
Black and white photo (Benson 1982: Figs.798-800, pp.762-763).

Black and white photo (Earle 1963: p.75).
Black and white photo (Gierisch 1981: Fig.801, p.10).
Black and white photo (Heil 1981: Fig.18, p.28).
Line drawing (Welsh 1979: p.104).
Line drawing (USFWS).
Color photos (USDA, NRCS PLANTS Database, accessed 12/10/2003 from http://plants.usda.gov/gallery/)
Line drawing (*In* Falk, Jenkins et al. 2001)
Color photos (Lee Hughes/BLM, *in* Falk, Jenkins et al. 2001)
Color photo (Art Phillips, *in* Falk, Jenkins et al. 2001)
Color photo (USFWS, Arizona ES, accessed 12/10/2003 from http://arizonaes.fws.gov/images/Siler%20Pinchusion%20Cactus%20a.jpg)
Color photos of plant and habitat (C. Delmatier, *in* Utah Rare Plant Book).
Color photo (Ben Franklin, Utah Div. Wildf. Res., accessed 12/10/2003 http://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=pedisile)

TOTAL RANGE: Limited to southwestern Utah (vicinity of St. George) and northwestern Arizona, where it is ecologically restricted to a specific gypsum and salt-rich soil.

RANGE WITHIN ARIZONA: Northern Arizona in Mohave County from Hurricane Cliffs to vicinity of Pipe Springs and Fredonia, Coconino County.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Succulent perennial.

PHENOLOGY: Flowers from April to mid-May, with fruits maturing May through June; March – April (June – August) in Utah.

BIOLOGY: Though flowers may remain open for more than three days, only one day is needed for pollination to occur. In Arizona, bees which pollinated *P. sileri* were six species of *Ashmeadellia* and one of *Anthophora* (from Tepedino). Mortality in *P. sileri*, has been caused by unidentified insect larvae, which eat the cactus leaving a shell of thorns behind. Rabbits and rodents also use *P. sileri* as a food source.

Limiting factors for *Pediocactus sileri* include: specialized soil type, cold winters, summer dormant period, and drying out periods.

HABITAT: Low red or gray gypsiferous badlands derived from the Moenkopi Formation, 2,800-5,400 ft (850-1650 m) elevation. In Utah, also found in seleniferous and calciferous shale, besides gypsiferous shale of the Moenkopi Formation (Utah Native Plant Society, 2003).

ELEVATION: 2,800 - 5,800 ft. (854 - 1,769 m); 3,000-5,200 ft. (915-1586 m) in Utah (Utah Native Plant Society, 2003).

EXPOSURE: All aspects and on slopes varying from 0-80 degrees.

SUBSTRATE: Gypsum, selenium, calcareous soils high in soluble salts, from the Moenkopi Formation.

PLANT COMMUNITY: "*P. sileri* occurs within three broad vegetation communities. The largest distribution is in the Great Basin Desert Shrub Biotic Community; a few of the higher elevation cacti sites are located in the Great Basin Conifer Woodland and Plains and Great Basin Grassland; one low elevation cacti site is located in the Mohave Desert Scrub" (Hughes, 1990).

P. sileri occurs in the sagebrush, desert shrub and pinyon-juniper forest/rangeland associations. The vegetation is of low stature and very sparse. Dominant associated species include: *Atriplex confertifolia* (Shadscale), *A. canescens* (four-wing saltbush), *Artemisia tridentata* (big sagebrush), *A. bigelovii* (flat sagebrush), *Gutierrezia sarothrae* (broom snakeweed), *Eriogonum corymbosum* (crispleaf wild-buckwheat), *E. microthecum* (slender buckwheat), *Chrysothamnus nauseosus* (rabbit-bush), *C. viscidiflorus* (stocky-leaf rabbit-bush), *Ephedra* spp. (Mormon tea), *Hilaria jamesii* (James galleta), and *Oryzopsis hymenoides* (Indian Mountain-ricegrass). At higher elevation sites, associated species include: *Pinus edulis* (two-needle pinyon pine), *Juniperus osteosperma* (Utah juniper), *Cowania mexicana* (cliffrose), and *Yucca baccata* (Banana yucca). At some low elevation sites, associated species include: *Larrea tridentata* (creosotebush), *Ambrosia dumosa* (white bursage), and other species of low elevation desert. (ESIS, FWIE 1998).

POPULATION TRENDS: "The Bureau of Land Management, Arizona Strip District, has documented the plants on 17,000 ha of land. In most cases individual plants are widely separated, but the survey did find 3 dense populations with at least 2700 plants each. Additional suitable habitat remains unsurveyed." (NatureServe 2003).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS:
LT (USDI, FWS 1993)
[PT USDI, FWS 1993]
[LE USDI, FWS 1985]
[PE USDI, FWS 1980]
[PE USDI, FWS 1976]
[PE USDI, FWS 1975]

STATE STATUS:
Highly Safeguarded (ARS, ANPL 1999)
[Highly Safeguarded (ARS, ANPL 1993)]

OTHER STATUS:
Not Sensitive (USDA, FS Region 3 1999)
[Forest Service Sensitive (USDA, FS Region 3 1990)]
Bureau of Land Management Sensitive (USDI, BLM AZ 2005)
Appendix I (CITES 1983)
Rare in AZ and Endangered in UT (IUCN 1998)

MANAGEMENT FACTORS: This species is vulnerable to threats because of its specific habitat requirements. Potential threats include: illegal collection, herbivory, off-road vehicle traffic, trampling by livestock, especially in wet soils, uranium exploration, and pesticide application. (USFWS, Arizona ES, accessed 2003). Gypsum mining is no longer considered a threat; the gypsum in *P. sileri* habitat is of low quality and quantity.

BLM monitoring plots have shown that the greatest mortality of plants is due to predation by rodents, lagomorphs and insects.

CONSERVATION MEASURES TAKEN: Several Areas of Critical Environmental Concern are being established by BLM. Extensive surveys completed by BLM. Annual monitoring conducted by BLM on plots at Warner Ridge (Utah) and in Arizona at Yellowstone, Johnson Spring, and Atkin Well. At Atkin Well, monitoring includes both exclosure and non-exclosure plots.

Based on Hughes (1990), "*Pediocactus sileri* should be downlisted and managed as a Threatened species. All five criteria for downlisting as stated in the Recovery Plan [of 1986] have been met. The populations appear healthy at this point in the monitoring program in all trend areas, which are representative of the total population. Desired population structure objectives should be established in cooperation with botanists specializing in plant population ecology."

Is protected by the Lacey Act (P.L. 97-79, as amended; 16 U.S.C. 3371 et seq.).

SUGGESTED PROJECTS: Studies are needed on the ecology and population biology including soil needs, water needs, the effect of small herbivores, determining pollinators, life history requirements, and demographic trends, and the application of this information to land and species management plans. Searches for other populations are needed within the known area and in suitable habitat nearby. Documentation is needed of collecting losses through permanent plots. Propagation techniques are needed to provide nursery stocks both to reduce collecting and for possible reintroduction.

LAND MANAGEMENT/OWNERSHIP: BIA – Kaibab Paiute Reservation; BLM – Arizona Strip Field Office; State Land Department; Private. This species is not expected to occur on National Forest land. In Utah, this species also occurs on BLM land (Kanab and St. George Field Offices (Utah Native Plant Society, 2003).

SOURCES OF FURTHER INFORMATION

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MAJOR KNOWLEDGEABLE INDIVIDUALS:

Ralph Gierisch - St. George, Utah.
Lee Hughes - Bureau of Land Management, Arizona Strip District, St. George, Utah.
Dr. Art Phillips – Private consultant, Flagstaff, Arizona.
Vince Tepedino - USDA, Agricultural Research Service, Bee Lab, Utah State University, Logan, Utah.

ADDITIONAL INFORMATION:

Recommended for downlisting to Threatened by USFWS Arizona Plant Recovery Team, 1992.

Gierisch, in 1980, made a map identifying potential habitat of *P. sileri*.

P. sileri is not known to occur on Forest Service lands. There is probably little potential habitat on the Kaibab NF, the only possibility being north of Highway US 89A as the road drops off of the plateau (including portions of section 34).

Vince Tepedino of the USDA-ARS Bee Lab completed a report on insect predators on *P. sileri*. A copy of this report has not been received by AGFD.

Revised: 1991-12-06 (DBI)
1992-05-28 (BKP)
1992-09-14 (BKP)
1997-10-24 (SMS)
2003-01-22 (SMS)